WHAT IS CLAIMED IS

1. An offshore fluid transfer system which includes a fluid-passing seafloor structure such as one connected to a seafloor well or pipeline, a compliantly anchored floating structure such as a vessel, at least one mooring line that is anchored to the seafloor and that holds said floating structure in the vicinity of said seafloor structure and at an initial position in a calm environment, and a fluid-carrying conduit structure that extends up from said seafloor structure to said floating structure, wherein:

said conduit structure includes a rigid seafloor riser support that lies at a location of said sea of predetermined sea depth, said riser support extending above the seafloor by a height of at least 15% of said sea depth, said riser support having lower and upper portions lying respectively at the seafloor and at a height of a plurality of meters above the seafloor;

said conduit structure includes a conduit that extends largely upward along said seafloor riser support to said upper portion of said seafloor riser support that lies at a height of at least 15% of said sea depth, said conduit including a flexible portion that extends in a double catenary curve from said upper portion of said seafloor riser support to said floating structure in said calm environment;

said riser support has sufficient average horizontal width and length dimensions, compared to its height, that said riser support supports the conduit structure without an underwater buoy to pull up the top of the riser support.

2. The system described in claim 1 wherein:

said rigid seafloor riser support has an average horizontal width and an average horizontal length, that are each more than 5% of the height of said rigid seafloor riser support above the seafloor.

3. The system described in claim 1 wherein:

said seafloor riser support extends above the seafloor by at least 20% of said predetermined sea depth, said seafloor riser support has average horizontal width and length dimensions that are each at least 15% of the height of said seafloor riser support above the seafloor, and said upper portion of said seafloor riser support is devoid of attachment to an underwater buoy having an external volume at least 25% of the external volume of the seafloor riser support.

4. The system described in claim 3 wherein:

said seafloor riser support extends sufficiently above the seafloor, that the vertical distance between the top of said seafloor riser support and the lowermost part of said vessel, when the vessel is fully loaded, is less than 50% of said predetermined sea depth.

5. The system described in claim 1 wherein:

said conduit includes a rigid pipe of a length of a plurality of meters that extends along a plurality of meters of the height of said riser support and that is fixed to said riser support at a plurality of locations spaced apart by a plurality of meters, and said conduit flexible portion extends from said rigid pipe and from said seafloor riser support to said floating structure.

6. The system described in claim 5 wherein:

said conduit structure includes a curved rigid pipe section with an inner end connected to an upper end of said rigid pipe and an outer end connected to said flexible conduit portion, said pipe section inner end extending at an upward incline away from rigid pipe and said pipe section outer end extending at a downward incline away from said pipe section inner end.

7. The system described in claim 1 wherein:

said seafloor riser support upper portion forms a convexly rounded hose-supporting top surface, and said conduit flexible portion includes a part that extends around said top surface and that can lift off said top surface and lay back down on said top surface.

8. The system described in claim 1 including:

at least one pile that is driven into the seafloor and that fixes said rigid seafloor riser support to the seafloor.

9. An offshore fluid transfer system that lies in a sea of predetermined depth for transferring fluid between a fluid-carrying seafloor structure that lies at the seafloor and a floating structure that floats at the sea surface and that is compliantly anchored to remain in the vicinity of the seafloor structure, the system including a conduit comprising a flexible conduit member that extends along much of the sea depth, said conduit having upper and lower ends coupled respectively to said floating structure and to said seafloor structure, comprising:

a rigid frame having a lower end fixed to the seafloor and an upper portion extending above the seafloor by at least 15% of said sea depth; and wherein

said conduit has a lower portion mounted on said rigid frame, said conduit extends along said frame to said frame upper portion, and said conduit has a portion that includes said flexible conduit member that extends from said frame upper portion to said floating structure;

said rigid frame having a horizontal average width and a perpendicular average horizontal length that are each at least 15% of the height of said rigid frame above the seafloor, and said frame upper portion is supported

substantially only by the rest of said frame under said upper portion and not by an underwater buoy.

10. The system described in claim 9 wherein:

said conduit includes a rigid pipe mounted on said frame and extending a plurality of meters along said frame, said rigid pipe having an upper end connected to said flexible conduit member.

11. The system described in claim 9 wherein:

said rigid frame has a convex upper surface with a radius of curvature of a plurality of meters, and said flexible conduit member has a lower portion that lies on said convex upper surface.

12. The system described in claim 8 wherein:

said rigid frame extends at an incline of more than 10° to the vertical and to the horizontal as viewed along a lateral direction; and including

a plurality of rigid pipe members spaced in said lateral direction along said frame, one of said rigid pipe member comprising at least a portion of said conduit lower portion;

a plurality of flexible conduit elements, including said flexible conduit member, having lower ends extending from said pipe members and having upper ends coupled to said floating structure.

13. The system described in claim 9 wherein:

the vertical distance (M) between the upper end of said rigid frame and a bottom of said floating structure, when said floating structure is fully loaded, is less than 50% of sea depth.

14. A method for flowing hydrocarbons between a seafloor structure

that lies at the seafloor and a floating structure that floats at the sea surface and that is complianty anchored to drift but remain in the vicinity of said seafloor structure, by passing the hydrocarbons through a conduit that extends between the seafloor structure and the floating structure, comprising:

rigidly supporting a conduit lower portion along a height of at least 15% of the sea depth, by a riser support with an average horizontal width and average horizontal length that are each at least 15% of the height of the riser support above the sea floor, and without applying an appreciable upward force to an upper portion of the riser support by an underwater float or other means.

15. The method described in claim 14 wherein:

said conduit includes a rigid pipe that extends along a majority of the height of the riser support, said pipe being free of a surrounding gas-filled casing that would apply buoyancy.